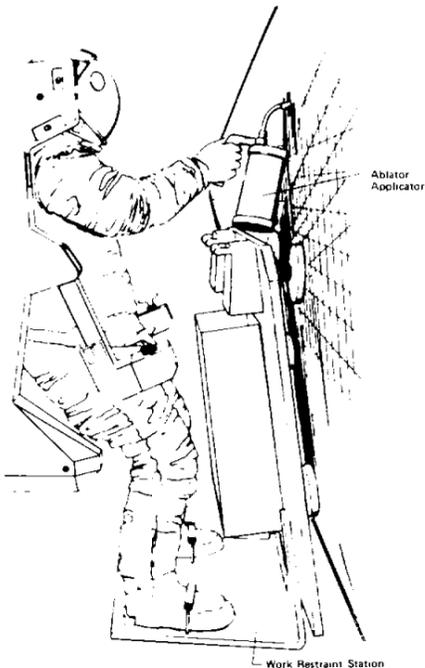


Ablative materials to be carried onboard in on-orbit tile repair kits for later flights



Repairing tiles in orbit

NASA has signed a letter contract for the development and production of a Space Shuttle on-orbit thermal tile repair kit.

The kit is designed for use by Shuttle crews to repair possible damage to any of the thousands of ceramic-based tiles which cover the Orbiter and protect it from intense heat during entry into the Earth's atmosphere.

The kit will not be flown on the first test flight but will be held in reserve for possible use on later flights where the launch environment approaches design conditions. The kit weighs about 300 pounds and will be stored atop the Auxiliary Equipment Storage Assembly in the Orbiter cargo bay.

There are two separate types of repair material: blocks of precured ablative material to fill in large holes and ablative paste which will be used as an adhesive for the replacement blocks as well as a cure-in-place filler to repair areas smaller than tile size.

Each kit will contain 160 replacement blocks. Each block will be approximately six-by-six inches in size with varying

thicknesses of 3/4-inch to 1.5-inch. The blocks are principally made of silicone rubber which will ablate when subjected to the heat of entry. The actual Orbiter tiles do not ablate during the heat entry.

The cure-in-place ablator is a paste-like substance with a silicone-rubber base. It will be applied with an applicator which resembles a conventional caulking gun. Eight applicator guns are included in the repair kit.

If necessary to perform repairs, a spacesuited astronaut would don a backpack maneuvering unit in the Shuttle cargo bay, inspect the outside of the Orbiter, and if necessary, use the kit to apply the ablative materials.

The letter contract with Martin Marietta Aerospace, Denver Division, is preliminary to an official contract award and authorizes the firm to proceed with immediate design and development of the tile repair kit. Estimated value of the contract is \$2.1 million.

The contract calls for Martin to design and fabricate three repair kits for delivery to NASA. Two of the units are for flight use and the third is for astronaut training.

30-hour sim instructive

In 'good shape' launch to entry

It was well into the 29th hour of the 30-hour sim, and the activity level was up in Mission Control Center. The Flight Director, shuffling papers, requested data from controllers. Eugene Krantz, at the FOD console, paced the full radius of his headphone cord.

Astronauts on *Columbia* had activated a de-orbit burn during loss of signal and controllers now waited the 16 minutes until next contact. The body flaps on *Columbia* were down, a problem programmed in by crew trainers—a problem controllers and astronauts were still trying to solve.

Team members from other shifts started coming in, piling raincoats and umbrellas on the floor, and plugging headsets in to listen to the last minutes of this first 30-hour exercise.

"*Columbia*, Houston. We had a good OMS burn."

"RCS propellant is right on the red line."

"There's 55 seconds to LOS."

"The body flaps look good. We're seeing the body flaps coming up."

LOS: Next communication would be when *Columbia* went over the California tracking station.

Controllers paced, tapped their fingers, leaned on the consoles; Pat Patnesky moved discretely through the room shooting pictures. Mr. Krantz squinted over the room, squinted at the console, paced.

"*Columbia* to Houston. How do we read?"

"We're in good shape. Nav looks good on the ground track."

"Everything's in good shape. We're crossing the coastline now."

"Crip, if the AP flames out, no action is required."

"Understood."

"How's the fuel looking?"

"We're slightly high on energy."

"Watch your H-dot, *Columbia*."

Controllers sat quietly, listening to the static on the loop, watching data on the console CRTs.

"Houston, *Columbia*. We have come to a stop."

A propulsion controller took a long swig on a can of root beer and the Flight Director announced there would be a 20-minute break before debriefing.

CapCom Ed Gibson stopped to talk to a reporter: "We learned a lot about how to fit all the phases together. We especially learned the small details on making a handover (shift change).

"The sim was a success for ground controllers. We were able to get a feel for the continuity of a mission which we could not get when we were doing only one phase.

"This was especially important during the ascent phase. We were able to see what effects our actions would have 10 hours later."

The sim began with launch at 8 a.m. Thursday, January 24 and ran continuously through on-orbit procedures to landing. There will be additional 30-hour practice flights every six weeks to two months in preparation for the first flight of *Columbia*.

Unplug Your Coffee Pots

The Safety Office reports that "hot pots" are getting to be a problem and a fire hazard. The water steams out overnight and coffee pot elements can heat up. A fire broke out overnight recently in Building 32, and it was

caused by a plugged-in pot.

Suggestion: Assign one person and a backup in each office the responsibility of turning off coffee and hot water pots at close of business each day. HELP PREVENT FIRES.

Final SRB motor test-fire to occur near pioneer site

A qualification motor for the Shuttle's large solid rocket boosters will undergo static firing for the last time in the Utah desert on February 14. The firing will complete a successful series of four development and three qualification tests conducted to prove that the motor is ready for flight.

This significant event will occur just a few miles from the spot where a golden

spike was driven into a railroad tie on May 10, 1869, to mark the completion of the first transcontinental railroad. Just as the railroad opened the West for exploration and settlement, the Space Shuttle will provide routine, inexpensive transportation to and from space for men and equipment.

The Space Shuttle booster's solid rocket motor segments are manufactured and loaded with propellants by the prime contractor, Thiokol Corp., at its Wasatch Division plant near Brigham City, Utah. The company is presently gearing up to go into full production and is constructing and modifying facilities for refurbishing motors recovered after flight. Segments of the new motors, as well as the refurbished ones, will be shipped by rail from Utah to Kennedy Space Center, where they will be assembled for flight.

Cluster test-firing set

NASA has tentatively scheduled another full duration run of the three Shuttle main engines for February 22 at the Bay St. Louis, Mississippi facility. A full duration run on February 1 was cut short after four and a half seconds when an over temperature was indicated in engine three.

Last Friday's test was the second try at running the three engines for full duration launch phase. A review of the data from the test was to have been conducted on Wednesday, February 6.



Wanted: Healthy Smokers

The JSC Cellular Analytical Lab needs approximately 50 volunteers from the site—healthy cigarette smokers between the ages of 30 to 60 years—to participate in a project that is in progress studying the developmental aspects of cancer of the lung.

Lung cancer is a worldwide problem, especially in the more industrialized countries. Statistics on lung cancer in the United States show an excess of 80,000 deaths a year, and an associated economic loss of \$2 billion per year. Lung cancer often remains asymptomatic, until late in its development which may span 10 to 40 years.

The CAL project, a cooperative agreement with Baylor College of Medicine with sponsorship by the National Cancer Institute, is developing techniques for evaluating pre-cancerous lesions in the respiratory tract by analyzing sputa from the natural section of the lungs. The project has been in progress for three years.

Volunteers will be paid \$10 for each sputum specimen taken. It will only take about 15 minutes, and you can withdraw from the study at any time. Not all volunteers will be selected for the study.

Persons interested in participating should call x4696 and leave their name and phone number. They will be contacted with further details of the study.

10 YEARS AGO

Astronaut Fred Haise tests the motorized "lunar drill" which was used to obtain core samples from the Moon's surface. Photo ran in February 13, 1970, Roundup.

Profile

Engineer-poet combines analytical mind With sensitive skill and creative hobby

At the end of a long dark hallway in Building 45 behind a closed door, sits Warren Gillespie. His desk is piled with manuals on Solar Power Satellites and space planning.

Mr. Gillespie has been a space program engineer since 1948 when he was doing research for NACA. But his interest in aeronautics began at age 10 when he started building model airplanes.

"I've had lots of hobbies all my life," Mr. Gillespie says. "When I got to college I figured I better find one that paid."

Cosmology is one of his hobbies; another is poetry:

An Analogy

*Into the water fell a stone
By what means, was it thrown?
The stone descended to the
water bed
As ripples ever outward spread,
A child stood there alone.
Into black space a blob was
massed
By what means was it cast?
The blob exploded with shifts of
red
As clusters ever outward spread
'Till nothing is there alone.*

"That poem expresses a central point in cosmology," Mr. Gillespie says. He



Warren Gillespie

then contrasts the Big Bang, Oscillating, and Steady State theories on the evolution of the universe. "This poem describes a potential fourth cosmology

theory that I'm working on now as a hobby."

The poet engineer sits by day in his solitary office in an anonymous hallway, his head buried in System Definition Studies on Solar Power Satellites. "And I drink a lot of coffee," he adds.

One of his current projects at NASA is finding ways to use solar concentrators in SPS design to reduce the number of solar cells required "by a factor of a hundred or so." Another is design and construction of an SPS "in an exponentiating manner" which would allow NASA to start the project sooner and on a smaller scale, then build additions to the satellites while they are in use.

He hands the reporter a photocopied sheet of his poems. "Vibration" was printed in the Rice University newspaper when he was a student there. They called it "An Engineering Version of the Raven."

A line from one poem reads: "To be with that pretty red bird/Climbed I high up that tree. . . ." When asked about "Red Bird," Mr. Gillespie blushes and says, "Everything is not always what it seems to be."

He doesn't usually make photocopies of his poems. "I can write them out for you. They're all in my head. A lot of things seem to stick in my head."

At Gilruth Center

In response to popular demand, the Gilruth Rec Center will be open longer hours beginning February 15. These extended hours are for a 90-day trial basis, and if they prove popular, the change will become permanent.

New hours are: Monday through Friday 9 a.m. to 9:45 p.m.; and Saturdays 8 a.m. to 4:30 p.m.

Sports Information: Gilruth Center is now accepting registrations in the following team sports:

Mixed Volleyball: Meets Friday nights; registration deadline is February 12.

Women's Basketball: A Monday night league; registration deadline is February 20.

Men's Basketball: The Winter league will be divided into three groups, meeting Tuesday, Wednesday, or Thursday nights. Registration deadline is February 20.

Leisure Time Classes: There are some new additions to the Gilruth leisure time class schedule, and registration is going on now.

Country & Western Dance: Features the latest in C&W steps as well as the old standbys. Class meets on Monday evenings beginning March 24 for six weeks. There will be a beginners and an advanced class. Cost: \$15 per couple.

Better Picture Taking: A unique course designed to assist the photographer in improving skills. Course meets Thursday evenings from 6 to 8 and cost is \$25 per person. Class starts March 27.

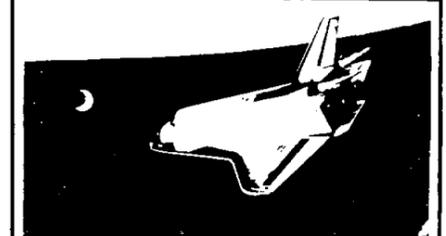
Aerobic Dance: Part exercise, part dance—a great system for getting in shape. The six-week course is available either day or night to suit your schedule: Tuesdays and Thursdays 9:30 to 10:30 a.m., or 6:30 to 7:30 p.m. Cost is \$25 per person, and first class is February 19.

Defensive Driving: Learn the art of safe driving and qualify for a 10% reduction in auto insurance. Class meets on Saturday March 29 from 8 a.m. to 5 p.m. and cost is \$15.

Call the Gilruth Center at x3594 for further information.

Everyone who works on site, including contractor employees, should receive a copy of *Roundup* in the mail. Keep your distribution up to date by filling out a JSCF 2271. Under "all employee distribution" list the number in your section who are to receive *Roundup*, including contractor employees as well as civil servants. Any questions on this, call the *Roundup* editor at x-5111.

Roundup deadline is the first Wednesday after publication.



The *Roundup* is an official publication of the National Aeronautics and Space Administration Lyndon B. Johnson Space Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for all Space Center employees.

Editor Kay Ebeling

Bulletin Board

It's Not Too Late To Sign Up for Golf

There is still time (until February 13) to join the JSC Golf Association in time for the February 18 Fun Tournament. Call Mike Gremillion (x3753) for information and application forms. If you can not make the February 18 tournament but want to join, you can do so up to March 1. The February 18 Fun Tournament will be held at the Willowisp Racquet Club, 14502 Fondren; starting time: 9 a.m.; green fee: \$8; cart fee: \$5.

Tennis Club 1980 Getting Active, Electing Officers and Playing Tennis

The JSC Tennis Club met at the Friendswood Racket Club in December to elect officers for FY80: President, Linda Horwitz x3035; VP, Susan McCown x2691; Membership, Lyle White x2686; Treasurer, Dave Schultz x2991; Secretary, Mary Wylie 488-5660 (x214); Ladder Chair, Bill Zrubek x3669; and Tournament Chair, Tom Murtagh x3217. It was a good meeting with some good tennis playing. Membership Drive Tournament - Singles - Feb. 22, 23, 24 - Tournament fees cover 1980 membership dues. Join and play tennis in 1980.

AIAA Membership Night Will Be a Special Program

With "A Tour of Jupiter and Its Satellites," the AIAA's February meeting should be a real "rouser," says Norm Chaffee. Dr. Jeffrey L. Warner of NASA's Planetary and Earth Sciences Division will give a program including the recent results from the Voyager spacecraft. The meeting will be Tuesday, February 26, at Gilruth Center, so mark your calendars now. For more information, contact Sarwar Naqvi at 488-5660, or Mr. Chaffee at x3918.

Space-Related Shows You'll See If You're Tuned to PBS Channel 8

At 4:30 Sunday February 10, members of Houston's scientific and academic community will discuss the region's

Black history program set

JSC will present a program February 15 for the 54th annual recognition of contributions Black Americans have made to American life and culture. This year's theme is "Heritage for New America."

Two workshops will be conducted in the Building 30 Auditorium at JSC:

PERSONAL FINANCIAL MANAGEMENT WORKSHOP will be conducted by Mrs. Cleo Myers Stewart from 9:30 to 11.

HUMAN BEHAVIOR WORKSHOP will be conducted by Dr. Warren H. Chaney from 11 to 12:30.

The Main Program will begin at 2 p.m. in the Building 2 Auditorium and will feature Judge Alexander Green, Harris County Justice of the Peace, as keynote speaker. Cultural expressions through musical presentations by the Jesse Jones High School Glee Club will also be presented.

All JSC and contractor personnel are invited to attend.

Credit Union Elections

JSC Federal Credit Union has scheduled the 1980 annual meeting for March 7. The meeting will begin at 7 p.m. on site at NASA in the Gilruth Center. Elections will be held on the same day for offices on the Board of Directors and Credit Committee. Voting machines will be at the credit union on March 7 from 9 a.m. to 3 p.m., then they will be moved to the Gilruth Center for voting from 4 p.m. to 7:30 p.m. Members interested in running for office should contact the Nominating Committee; Jerry Haptonstall, BB52; Eleanor Der Bing & Rae Chambers, BB62.

future on *Projection '80*. The *Voyage of Charles Darwin* series, narrated by Neil Armstrong, continues on Sundays at 7 p.m. On Tuesday, February 12, *Nova* presents "Einstein" at 8 p.m., a rare look at some of the little-known characteristics of this scientific genius. "Einstein" is repeated on Saturday the 16th at 3 p.m.

On Sale At The JSC Exchange Store

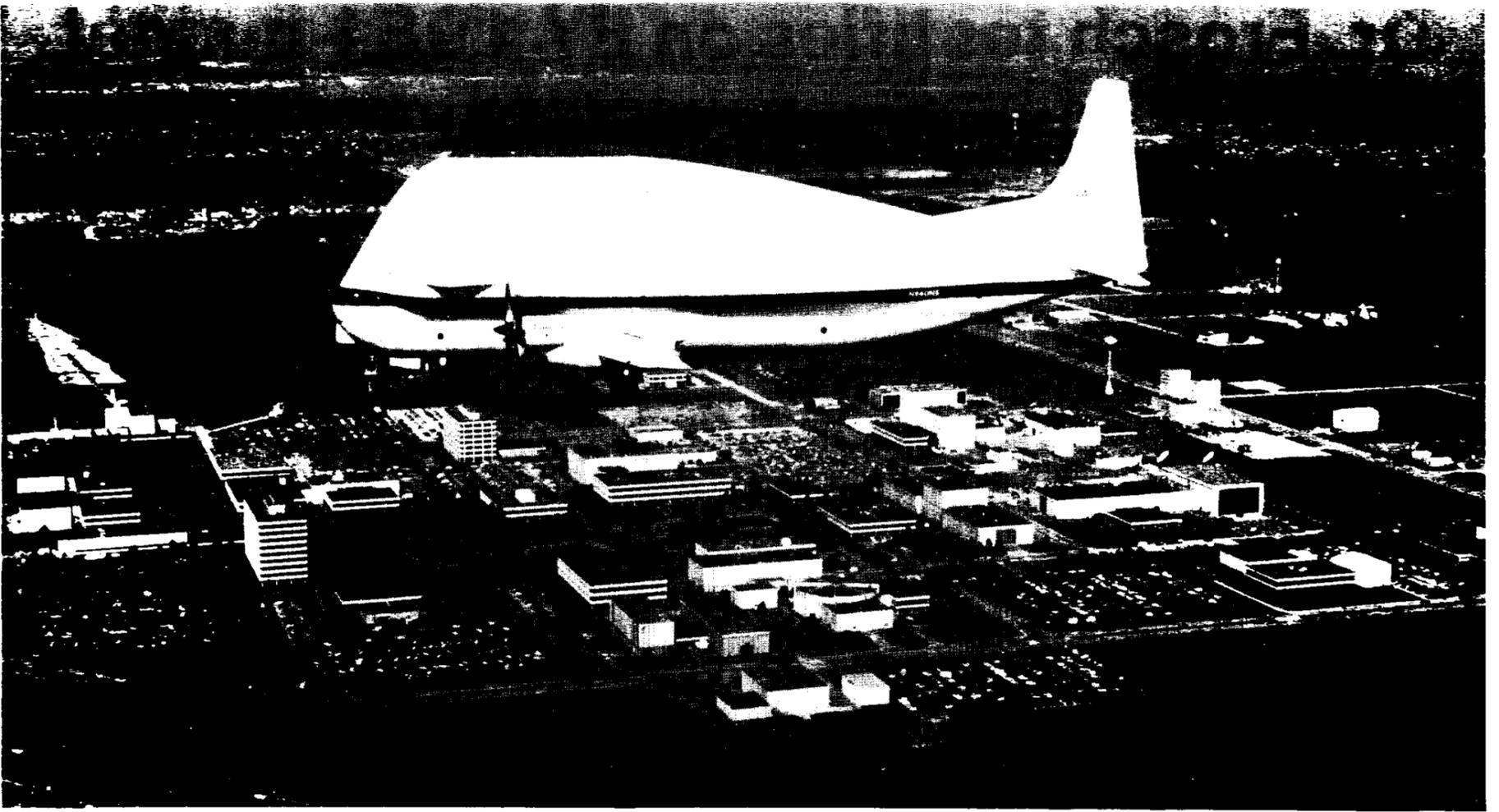
Dean Goss Tickets: \$10 single, \$20 couple (regular \$14.50)
ABC Theatre Tickets: \$2 ea.
General Cinema Tickets: \$2.40
Magic Kingdom Cards: Free
Entertainment '80 Coupon Book: \$15.

Come Hear a Concerto At UHCLC Sunday Afternoon

The University of Houston at Clear Lake Community Orchestra will give a concert at 3 p.m. February 10 in the Bayou Building. Featured will be Loraine Merrill, soloist, performing Beethoven's Piano Concerto Number Three. Tickets are available at the door: Adults, \$1.50, children and senior citizens, 50 cents.

NASA employees' Life Insurance

All employees with appointments of 12 months or longer and all reimbursable detailees are eligible for NEBA group life insurance. Group Life Insurance membership requires little effort; a completed enrollment card and a health statement. The enrollment cards and health statement forms may be obtained by calling the Personnel Office, x2681, or the NEBA Office, x5410.



As the Super Guppy flies over JSC and the Bay Area, no doubt everybody who is outdoors stops to look up, curious about the pregnant blimp humming overhead. Part Boeing 377 and part C-97, the Guppy is used to transport Shuttle equipment around the world in its 25-1/2-foot diameter cylindrical cargo hold. The Guppy can carry a maximum load of 46,000 pounds for 600 miles, and was originally designed to carry Saturn rocket components. In 1960, Jack Conroy of an innovative organization in California called Aero Spacelines, contacted Wernher von Braun with the Guppy concept.

By January 1, 1962, work was underway on construction of the first Guppy. There are four in existence today—a Pregnant Guppy, a Very Pregnant Guppy, a Mini-Guppy, and NASA's Super Guppy. In modifying the plane to carry large cargo, the wing span was increased by 15 feet, and the fuselage was lengthened by 31 feet. The Super Guppy cruises at 261 knots (300 miles per hour), and the plane is not as easy to operate as regular aircraft, Guppy pilots say. For instance, it lands unusually, with the nose first. This photo was taken from a T-38 chase plane by Bobby Gray.

Roundup Swap Shop

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP3 Roundup, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads.

Property & Rentals

Lease/Sale: Baywind I Condo, 2 bedrooms, 2 baths, fireplace, patio, first floor, exc cond. 334-2461.

Lease: CLC Condo, 2 br, 1 bth, exc location, \$375/mo + deposit. 486-0621 or 486-0409.

Sale or Trade: Near Houston Yacht Club. Tax-free trade, 4-2-2 home, assume low interest loan; trade pre-1965 silver coins for equity. 488-2248.

Sale: 3-2-2, Near NASA, no flooding, can assume or finance. 482-5393 after 5.

Cars & Trucks

77 MGB, blue, 25,000 miles, AM/FM stereo cassette, exc cond, \$4500 firm. 333-3541.

79 Monte Carlo, 8,000 miles, vinyl roof, air, PS/PB, cruise, AM/FM stereo w/8-track, small V-8, \$5200. Pam x5021.

79 Silverado PU, loaded, 350 cu in, two-tone, 13,000 miles, exc cond, owner buying new vehicle. Hester 332-2291.

71 Marquis, all options, exc cond, \$800. 488-5079.

78 Olds Cutlass Salon, 9700 mi, \$4995. 332-4854 after 6.

78 Ford T-Bird, w/t-top, air, all power, cruise, AM/FM stereo w/8-track tape, Auto tran, auto trunk opener, 17,000 mi, \$6800. x2969 or 479-4463.

Chevy C10. V8, auto, reliable transportation, \$600 or make offer. 554-6201 after 5.

80 Chevrolet Citation, 4 door hatchback, 6 cyl, auto, 4000 miles. 473-8242.

75 Mark IV, designer edition, sun roof, velour, blue. 334-5298.

69 Ford Custom Club, 105 WB, 6 cyl, std, air, \$800. 334-2180.

78 Camaro LT, Maroon, one owner, power brakes, steering, air, auto, good cond, bargain at \$4700. Peacock x2208 or 486-0159.

78 Ford E150 Leisure Van, 2 tanks, many extras, \$7300. 334-2206.

71 VW super beetle, good cond, \$895. 334-2206.

77 Firebird Espirit, velour, AM/FM stereo, cruise, PS, PB, sport mags, pin striping, \$4500. Tom Rohrer x4528 or 479-6766.

76 Pacer, red, air, heater, radio, \$1200 due, take up \$63/mo note. Some body work needed. Kline x2776 or 337-4063.

72 Pinto hatchback, runs well, new tires, \$550. Scarlett x3271.

77 Thunderbird, blue, velour, cruise, new tires. 334-5298.

75 Caddy, Exc Cond, all extras, \$3150. Clarence x5266 or 741-0341 after duty.

79 Corvette, Dark brown metallic w/camel leather interior, My 1980 has been delivered. Thompson x2600 or 486-5395.

Household Articles

Antique twin bed with inlaid wood, \$200 or best offer. 481-3257 after 6.

Custom 7 gun cabinet, \$110. Free standing fireplace, \$150. Dickinson 534-4479 after 4.

9 x 12 green tweed rug w/foam rubber pad, exc cond, \$50. 488-7042 after 5.

Antiques in need of refinishing: hump-top trunk, drop leaf table, and piano. Make offer. 333-4959 leave message.

Pets

2-fer aquarium set, 10/15 gal metaframe tanks mounted on single stand, includes all accessories plus \$100 in African fish, total price \$150. 333-5797.

Free puppies, half Samoyed. 482-1635 after 5.

Pure-bred Collie pups, like "Lassie," 8 wks. 1 Sable and White female, 1 Tri-color male, no papers, \$85 each. Lottie Greenwood x5803 or 332-7334 after 6.

Free: 3-yr-old female AKC Irish setter and dog house. Maria x6308 or 334-1446 after 5.

Musical Instruments

Yamaha silver flute, exc cond, used only 2 years, \$125. 488-7042 after 5.

Electronic organ, Lowery Genie 44 w/rhythm section, 2 keyboards, bench and music, like new, \$950. Loden x5595 or 488-2273.

Miscellaneous

Remington Nylon '66' x22 auto rifle, bicentennial model, perfect, \$55. 488-3966.

120 pure silver medallions, 1.09 T. oz ea. Smith at x2367 after 4:30 p.m.

Brown & beige plaid sofa-sleeper (5 mos. old) \$250; boy's 4 pcs blue suit size 5, \$15. Call Vicky x4904 or 534-4778.

Carpools

Want to form carpool from Texas City, 7:30-4. Sincer x2617.

Want nonsmoking carpool member, Sam Rayburn High School area, NASA, 7:30-4:30 (adjustable) drive every 4th week. Mansfield x6101.

Need to form or join a carpool from Friendswood (Heritage Park area) to NASA, 8-4:30. Terri x2691.

Needed: Carpooler from Wedgewood Village to Bldg. 9 area, 7:45-4:30. Pat Daniel x3029.

Want carpool member, Hitchcock, to NASA, 7:30-4:30. Howard x2113.

Cycles

71 Honda 100 cc dirt bike, \$100; Four 15-inch Pontiac Le Mans rims, \$30. Anderson x7204 or 485-3025.

Wanted

Any old issues of NASA Activities and Roundup. Send to MT/Beth Deupree or call x3445.

Female room mate to share 2 br/2 bath apt. w/same, Seabrook, \$110/mo., no bills. Diana x3771, x4061 or 334-2481 after 5.

Small inexpensive sailboat for beginner that will hold two people. Susy x3796 or 332-5240.

Women's 26" bike in good cond. 946-4827.

Outboard motor, 40-60 hp, age not important, must run well. 482-3678.

First issue of Isaac Asimov's SF magazine. Will trade first 4 issues of IASF Adventure magazine. V. Martin x5393.

Boats & Planes

Fiberglass canoe, 16', exc cond, no patches, with paddles, \$150 firm. x5293 or 481-3900.

Trojan Twin 327 cu in w/fly bridge, sleeps 6, uses regular, financing available, Volick x3205 or 334-1177.

16' deep V, 75 hp Chrysler lo time, trailer, \$1550. Scarlett x3271.

Stereo & Cameras

Betamax VCR, 5400, new, never used, full warranty, 4-1/2 record time, stop action, "beta scan," electronic tuner and programmer, cost \$1395, sell \$960. 333-2974.

49 mm Polarizer, Tiffen screw-in filter, fits standard 50 mm lens, \$12.50. 1963 Voigtlander 35mm camera, inoperative, make offer. Malcolm Jones x2344 or 471-3303.

What's cookin' in the cafeteria

Week of February 11 - 15

Monday: French Onion Soup; Beef Chop Suey; Polish Sausage w/German Potato Salad; Breaded Veal Cutlet (Special); Okra & Tomatoes; Green Peas. Standard Daily Items; Roast Beef; Baked Ham; Fried Chicken; Fried Fish; Chopped Sirloin Selection of Salads, Sandwiches and Pies.

Tuesday: Split Pea Soup; Shrimp Creole; Salisbury Steak; Fried Chicken (Special); Mixed Vegetables; Beets; Whipped Potatoes.

Wednesday: Clam Chowder; Fried Catfish w/Hush Puppies; Braised Beef Ribs; BBQ Plate; Weiners & Beans; Shrimp Salad; Stuffed Bell Pepper (Special); Corn O'Brian; Rice; Italian Green Beans.

Thursday: Chicken Noodle Soup; Beef Stroganoff; Turkey & Dressing; BBQ Smoked Link (Special); Lima Beans; Buttered Squash; Spanish Rice.

Friday: Seafood Gumbo; Broiled Turbot; Liver w/Onions; Seafood Platter; Fried Shrimp;

Meat Sauce & Spaghetti (Special); Green Beans; Buttered Broccoli; Whipped Potatoes.

Week of February 18 - 22

Monday: Holiday

Tuesday: Celery Soup; Fried Shrimp; Turkey a la King; Pork Chop w/Applesauce; Chinese Pepper Steak (Special); Au Gratin Potatoes; Breaded Squash; Buttered Spinach.

Wednesday: Clam Chowder; Fried Catfish w/Hush Puppies; Braised Beef Ribs; Mexican Dinner (Special); Spanish Rice; Ranch Beans; Buttered Peas.

Thursday: Split Green Pea Soup; Corned Beef w/Cabbage & New Potatoes; Chicken & Dumplings; Tamales w/Chili; Hamburger Steak w/Onion Gravy (Special); Navy Beans; Buttered Cabbage; Green Beans.

Friday: Seafood Gumbo; Deviled Crabs; Broiled Halibut; Liver & Onions; BBQ Link (Special); Buttered Corn; Green Beans; New Potatoes.

Dr. Frosch testifies on FY 1981 budget

Even with 'substantial progress,' launch will be delayed; Shuttle booked thru 1984; NASA to be active in 1980s

On January 29, NASA Administrator Dr. Robert A. Frosch testified before the House of Representatives Committee on Science and Technology regarding this year's budget request. Following are excerpts from his opening statement.

Where are we headed in the 1980s?

Every sign points to a decade of vigorous activity in both aeronautics and space. This activity will be international in character, highly sophisticated in its technology, and rich in its contribution to scientific knowledge. It will be activity that has an important commercial dimension as the economics of spaceflight become increasingly attractive. Perhaps most importantly, the 1980s will be a decade when for the first time the life of almost everyone on Earth will be made significantly better by our ability to apply our skills in space to problems here on Earth.

The Space Shuttle and Spacelab will make possible the beginnings of true industrial experimentation to exploit applications of materials processing in space for new and improved processes and products. Symbolic of this promise is the fact that in this first month of the 1980s, we have signed our first agreement for a cooperative manufacturing activity with a private company.

But the greatest rewards, many unforeseen today, will be reaped from the seeds which are sown in the latter half of this decade as we begin to exploit fully the unique capabilities of the Space Shuttle. Already the Space Shuttle is fully booked into 1984 for advanced civil, defense, commercial, and international missions. The following years promise a period of exploration and achievement in space, made possible by applied research and technology—fields in which this country has always excelled.

Non-inflationary economic returns

In concert with the aerospace community, universities, the commercial sector, and the international space community, NASA initiatives and expertise using the Space Shuttle as a focus will play a significant role. Moreover, by generating and transferring technology,

NASA activities will continue to spur positive non-inflationary returns to our economy and to support a strong national defense.

We are requesting \$300 million in supplemental FY 1980 appropriations, and \$1.873 billion in FY 1981 for the Space Shuttle. Continued technical development problems, primarily in the areas of the Orbiter Thermal Protection System (TPS) and the main liquid-fueled engines, have been the principal contributors to the delay in the first manned orbital flight test (STS-1).

Launch as late as 1981

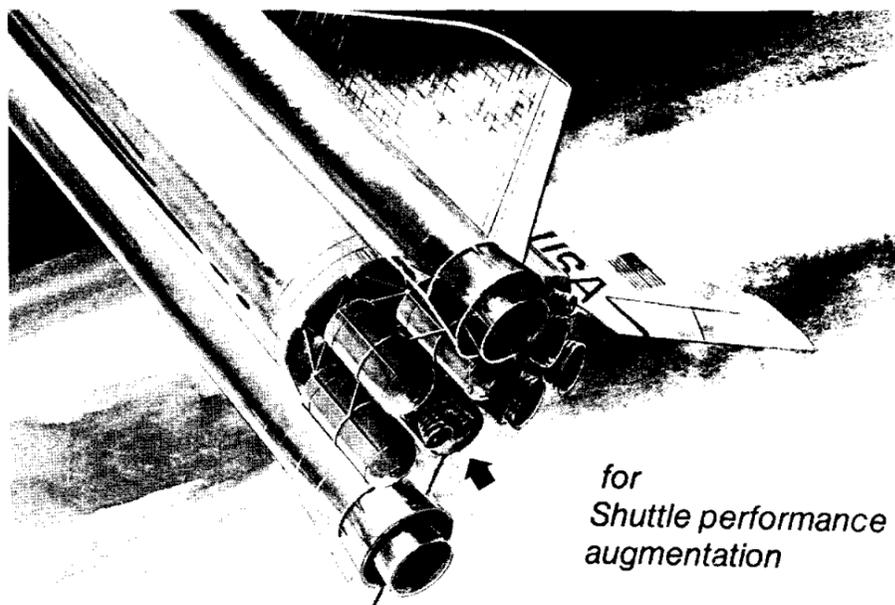
I do not believe we can complete this work on *Columbia* until well into the summer. This would mean that launch is not likely to come much before the end of this year. Our budget, with a timely supplemental appropriation, will support first flight as late as the end of the first quarter of calendar year 1981.

Despite the delays, we have made major progress. All major first flight hardware has now been delivered to the launch site and the solid rocket motor segments have been stacked on the mobile launch platform in the Vehicle Assembly Building. The Orbital Structural

"This budget request represents a continuing strong Administration commitment to completion of the Shuttle development program. FY 1981 activities will focus on orbital flight testing of the entire system and main engine testing to achieve full level performance."

Test Article Program has been completed and conversion of the test vehicle to the second flight Orbiter, *Challenger* (OV-099), was begun in November.

Main engine test time now exceeds 60,000 seconds and six solid rocket motor firings have been successfully conducted. Design certification review for the first flight has been completed, all launch facilities are in place and operational, and the launch processing system is on schedule to support the first flight.



for Shuttle performance augmentation

The Aerojet Liquid Boost Module will be used in mid-80s.

Although development progress was substantial during 1979, it has not sustained the pace necessary to accomplish the FY 1980 budget plan. Technical problems, necessary program changes, the need for more work than was pre-

viously planned—particularly in the TPS for the first Orbiter, and increased systems qualification and certification testing across all elements of the program—have contributed to program delays.

This delay and additional work coupled with the growth in a number of the prime and subcontractor efforts along with the need to provide for the potential impact of necessary changes and systems modifications have resulted in our requirement for an additional \$300 million, which the President has requested as a Supplemental Appropriation for FY 1980.

Progress on future Orbiters

Progress on future Orbiters

FY 1981 Design, Development, Test and Evaluation activities will focus on orbital flight testing of the entire system and main engine testing to achieve full power level performance. The budget request provides for completion of external tank and solid rocket booster deliveries to support the orbital flight tests, continued launch preparations, checkout and accomplishment of the orbital flight tests, and for continued engine testing leading to the uprated performance of 109% the rated power level.

In Shuttle production, fabrication efforts on the *Challenger* Orbiter will be nearly completed and work on *Discovery* (OV-103) and *Atlantis* (OV-104) will proceed in FY 1981 for delivery to support the Department of Defense and all other users at both Vandenberg Air Force Base and the Kennedy Space Center. Assuming early approval of the FY 1980 supplemental request, delivery schedules for these three Orbiters remain as follows: *Challenger* - June 1982; *Discovery* - September 1983; and *Atlantis* - December 1984.

Engine fabrication for the production

vehicles will continue and flight spares and ground support equipment will be procured. Additional launch processing equipment for the second line at Kennedy Space Center will be in the manufacturing stage during this time period.

This request also includes \$10 million for continued studies for Shuttle thrust augmentation to meet planned payload requirements for flights from Vandenberg in the mid-1980's. Late last year the Liquid Boost Module concept was selected as the baseline approach. This approach, which embodies liquid-fueled engines attached to the base of the external tank, offers lower development risk, less severe ascent loading, and greater performance and growth potential.

Expendable launch vehicle backups

The Space Flight Operations request of \$809.5 million is significantly higher than the FY 1980 program. This reflects the growing activity as preparations continue for the early operational flights. In total, 36 operational flights have been manifested and the system is essentially fully scheduled into 1984.

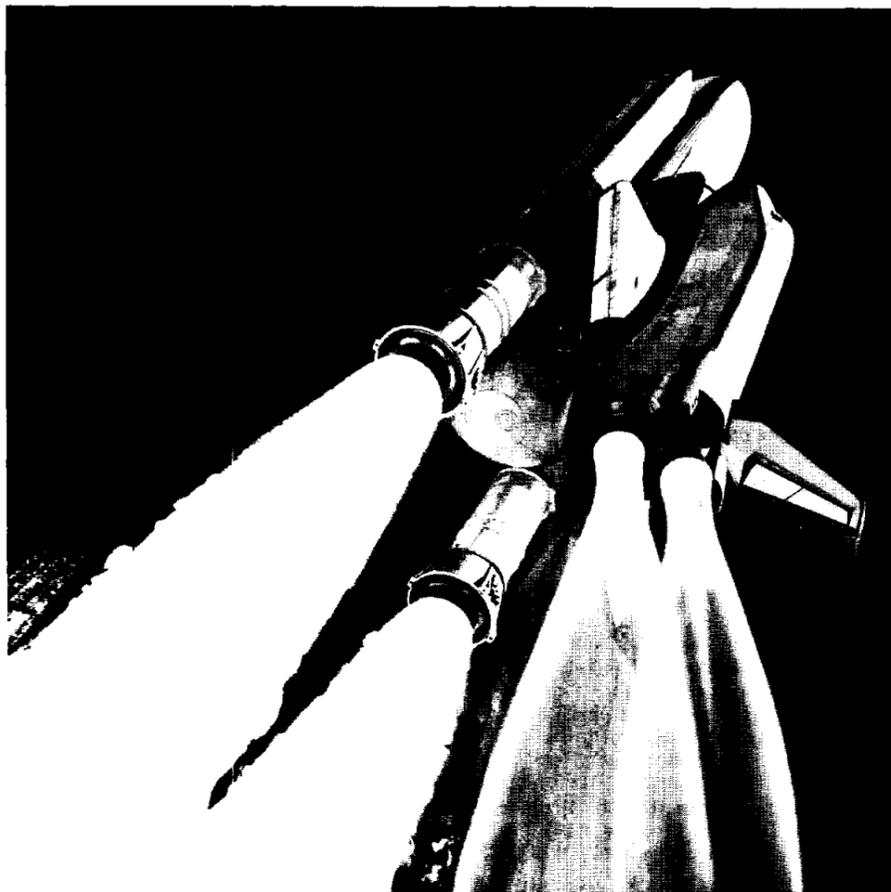
Expendable launch vehicle backups

For those early users affected by delay in the Shuttle schedule, the transition plan has been expanded to provide the back-up flights on expendable launch vehicles, as necessary. A total of \$55.7 million is included for expendable launch vehicles, a portion of which will be used to uprate the capability of the Delta 3910 launch vehicle, as we recently informed the Committee.

In conclusion, Mr. Chairman, this budget request taken with the request for Shuttle supplemental funding in FY 1980 represents a continuing strong Administration commitment to completion of the Shuttle development program and timely delivery of production Orbiters to meet critical civil and military needs. It provides for vital new starts in Space Science and Applications while continuing ambitious ongoing programs in physics and astronomy, planetary exploration, resource and environmental observations, and aeronautics and space technology.

Finally, it provides for the NASA in-house expertise and facilities necessary to conduct these programs.

Dr. Frosch testified Wednesday February 6 before the Senate Committee on Commerce, Science, and Transportation. The Committee is holding six days of hearings concerning NASA's FY 1981 authorization.



Launch is not likely to come before the end of this year.